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Pycnogonida from south-eastern Australia

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ABSTRACT

Twenty species of Pycnogonida are recorded from shallow waters of the Australian states of Victoria and South Australia. Eight of these are new to science: *Ammothea* (*Lecythorhynchus*) *ovatoides*, *Achelia* *transfugoides*, *Nymphon* *dubitabile*, *N. conirostrum*, *Pallenoides* *stylirostrum*, *Stylopallene* *longicauda*, *Parapallene* *avida*, and *Anoplodactylus* *spinirostrum*.

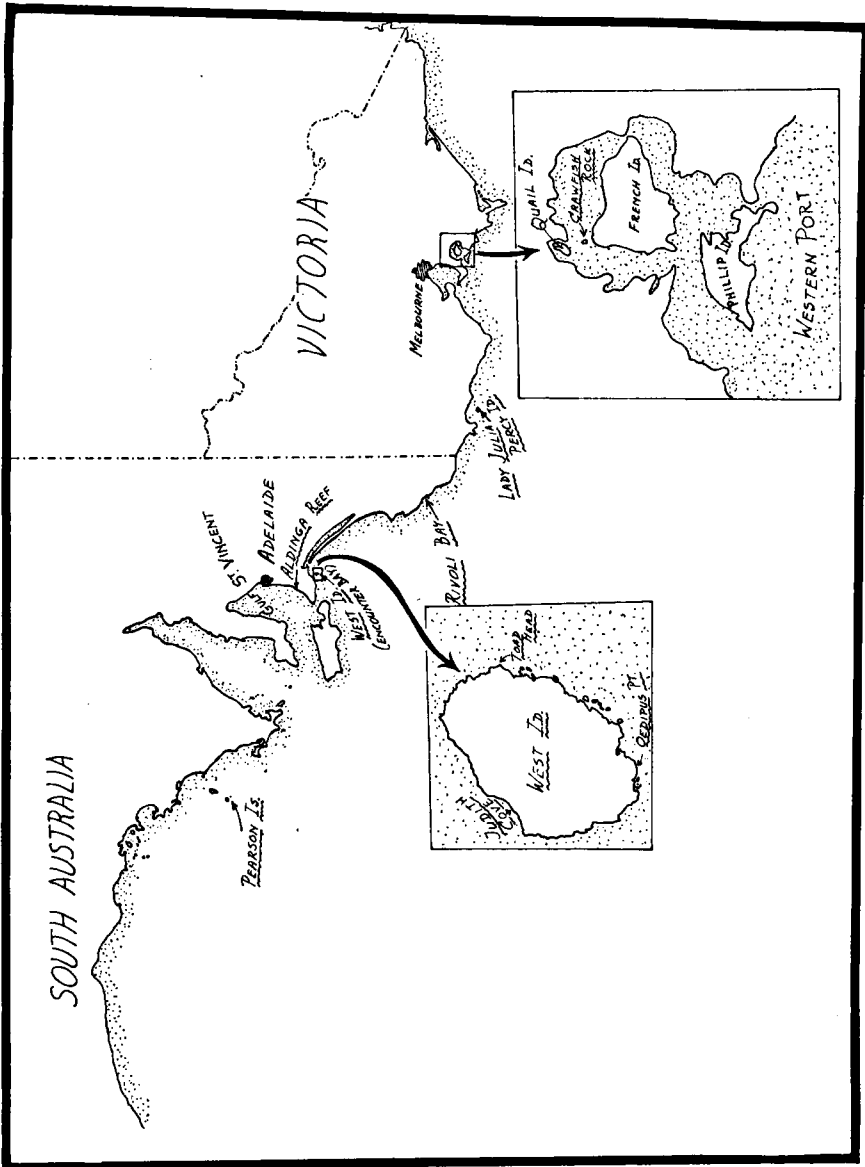
INTRODUCTION

The present paper is a partial fulfilment of a prophecy, viz. that of W. C. Clark, 1970 (of course on page 13), who contented that "the pycnogonid fauna of Australia is still largely unknown".

The greater part of the material treated in this paper came unexpectedly (as is goes with prophecies) to me, as air-mail parcels from heaven. It was collected by Mr. S. A. Shepherd, Senior Fisheries Officer at the Department of Fisheries, Adelaide, South Australia. Mr. Shepherd proved to be a most talented catcher of such hard-to-find organisms as sea-spiders. His material consisted of 20 identifiable species (almost half the number known from Australia) of which no less than 8 were new. This high percentage of new species is less surprising if one knows that most samples came from the area West of Port Phillip (Melbourne) from which, according to Clark (1963: 2), no pycnogonids have been recorded. After Clark's comprehensive paper, a few records from the Great Australian Bight have been published (Stock, 1968), but in general the area from which the present collections came is still largely "terra incognita".

In addition to Mr. Shepherd's collections, a number of samples from the same general area have been provided by the South Australian Museum, Adelaide. I am indebted to Mr. Shepherd and to the authorities of the Museum for their efforts in making these interesting collections available to me.

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Map I.

The south-eastern part of Australia (states of Victoria and of South Australia). The localities mentioned in the text are indicated by wavy underlining. Spelling of the geographic names as in the "Times Atlas of the World", comprehensive edition, 1968. Insets (West Island and Western Port) based on data provided by S. A. Shepherd.

The localities from which material is treated in this paper, are shown in map I. The material is preserved in the Zoölogisch Museum, Amsterdam (Z.M.A.) and in the South Australian Museum, Adelaide (S.A.M.).

The species treated in this paper can be classified as follows:

Family Ammotheidae Dohrn, 1881

Genus *Ammothea* Leach, 1814

Subgenus *Ammothea* Leach, 1814

A. (A.) australiensis Flynn, 1919

Subgenus *Lecythorhynchus* Böhm, 1879

A. (L.) ovatoides n.sp.

Genus *Achelia* Hodge, 1864

A. transfugoides n.sp.

A. assimilis (Haswell, 1885)

A. sp.

Family Nymphonidae Wilson, 1880

Genus *Nymphon* Fabricius, 1794

N. aequidigitatum Haswell, 1885

N. mollerii Clark, 1963

N. dubitabile n.sp.

N. conirostrum n.sp.

Family Callipallenidae Hilton, 1942

Genus *Pallenoides* Stock, 1950

Pallenoides stylirostrum n.sp.

Genus *Pseudopallene* Wilson, 1878

Ps. ambigua Stock, 1956

Genus *Stylopallene* Clark, 1963

S. cheilorhynchus Clark, 1963

S. longicauda n.sp.

Genus *Parapallene* Carpenter, 1892

P. australiensis (Hoek, 1881)

P. avida n.sp.

Genus *Pallenopsis* Wilson, 1881

P. macneilli Clark, 1963

P. sp.

Genus *Pycnothea* Loman, 1920

P. flynni Williams, 1940

Family Phoxichilidiidae Sars, 1891

Genus *Anoplodactylus* Wilson, 1878

A. evansi Clark, 1963

A. spirostrum n.sp.

A. micros Bourdillon, 1955

A. sp.

Family Pycnogonidae Wilson, 1880

Genus *Pycnogonum* Brünnich, 1764

P. aurilineatum Flynn, 1919

ACCOUNT OF THE SPECIES

***Ammothea australiensis* Flynn, 1919**

Lit. & possible syn.: cf. Fry & Hedgpeth, 1969: 81 (sub *A. magniceps*).

Material. — 2 juveniles. Pearson Island Survey, Gap at Dorothea; depth 1.50–6.00 m; in algae; 8 Jan. 1969; coll. S. A. Shepherd (Z.M.A.).

3 ♀, 2 ♂. St. Vincent Gulf, Aldinga Reef; intertidal under rocks; living in *Gelidium* sp. (Rhodophyta); 3 Sep. 1972; coll. S. A. Shepherd. (Z.M.A.).

Remarks. — The present specimens seem to confirm Clark's (1963: 59) opinion that *A. australiensis* and *A. magniceps* Thompson, 1884, are different species.

***Ammothea (Lecythorhynchus) ovatoides* n.sp. Fig. 1.**

Material. — 1 ♂ (ovig.), holotype. West Island, Toad Head; depth 5 m; in *Phacelocarpus* (algae); 11 Jan. 1970; coll. S. A. Shepherd. (Z.M.A.).

Description. — Trunk completely segmented; a distinct pseudo-articulation line runs between the ocular tubercle and the posterior border of the first trunk segment. Ocular tubercle low, slightly lower in the back than in the front when seen from the side; eyes well-pigmented. Abdomen erect. Lateral processes armed with 1 (lateral processes 1 and 4) or 2 (lateral processes 2 and 3) distal spines.

Proboscis of the more or less elongated oval shape found also in *A. (L.) marginata* (Cole, 1904).

Scape 1-segmented, without a trace of chelae, rather elongated (nearly 1/3 as long as the proboscis in dorsal view), armed with 3 or 4 minute spinules.

Palp 9-segmented. Segments 5, 6, 7, and 8 with ventral expansions, giving this part of the palp a "serrate" appearance. Distal palp segment contracted at the base, expanded slightly beyond the middle; this segment thus acquires a clavate aspect.

Oviger with the normal ("distorted") look, also found in *A. (L.) marginata*, caused by the anaxial articulations between segments 6 and 7, and between 7 and 8. Segments 8 to 10 with 2, 1, and 2 compound spines, respectively. These compound spines are leaf-like, provided with some 4 lateral teeth at either side.

Legs fairly slender. Coxa 1 with 2 distal spines; coxa 2 with several lateral spines; coxa 3 armed with smaller spinules only. Femur the longest segment; at its dorsal surface, at a certain distance from the distal end, a low, chimney-shaped cement gland opening is found. Femur and tibiae with several longer and shorter spines. Propodus curved; with well-developed heel, armed with 6 spines; sole with about 13 shorter spines. Claw robust, auxiliary claws nearly half as long as the claw. Sexual pores on coxa 2, not situated on any spur.

Remarks. — As a number of *Ammothea* species, such as *A. magniceps* Thompson, 1884 and *A. australiensis* Flynn, 1919, differed from *Lecythorhynchus* merely in having retained rudiments of chelae in the adult stage,

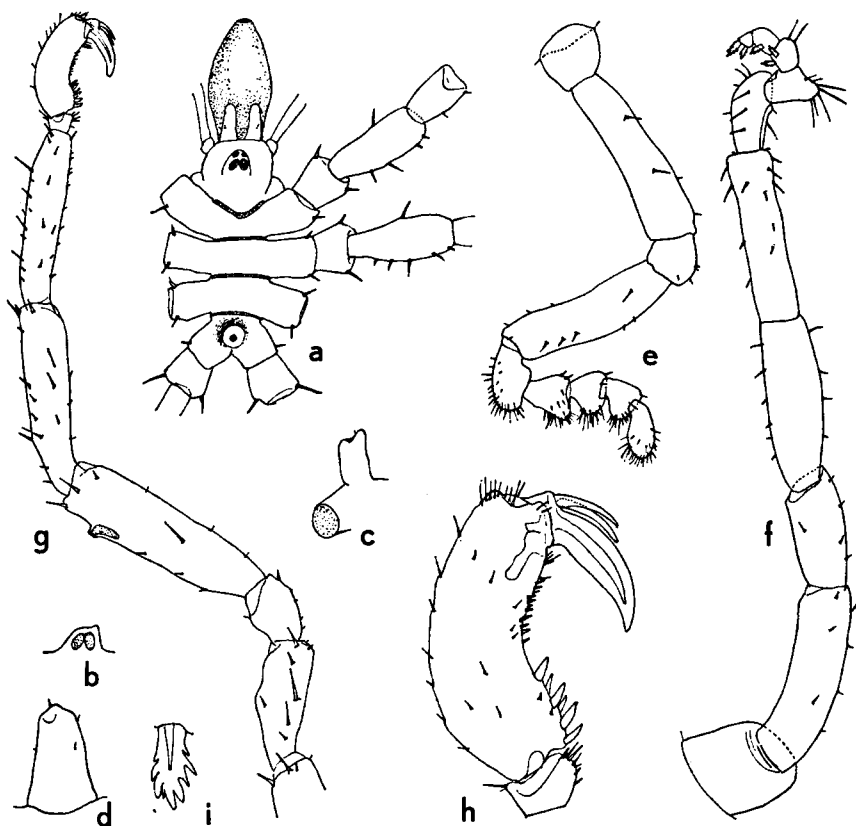


FIG. 1. *Ammothea (Lecythorhynchus) ovatoides* n.sp., ♂, holotype.
a, body in dorsal view; b, ocular tubercle from the right; c, abdomen from the right; d, chelifore; e, palp; f, oviger; g, third leg; h, distal segments of third leg; i, terminal spine of oviger segment 10.

Stock, 1956a, proposed to synonymize *Ammothea* and *Lecythorhynchus*. The description of a *Lecythorhynchus* possessing rudimentary chelae by Utinomi, 1959, as *L. hedgpethi*, seems to support this view. Since, however, Fry & Hedgpeth, 1969, fractionized *Ammothea* into a number of genera and subgenera, it seems wise to retain *Lecythorhynchus* as a subgenus of *Ammothea* for those members of the complex having 1-segmented chelifores (without rest of chelae). The species thus sorted out have anaxial palps (articulation between segments 5 and 6 eccentric), but *L. hedgpethi* (in which rudimentary chelae are present) shares this condition.

The following forms without chelae (= *Lecythorhynchus*) have been described: *hilgendorfi* Böhm, 1879 (the type-species), *marginatus* Cole, 1904 (according to Utinomi, 1959, synonymous with *hilgendorfi*), and *ovatus* Hilton, 1942. The latter is a dubious species, and re-examination of the type material (Stock, in print) has not revealed anything new, since the types

(probably by careless conservation) are in a more or less atomized state; at any rate, the atom model shows nothing to contradict Hedgpeth's (1949: 296) supposition that the differences between *ovatus* and *marginatus* are illusory. If so, that would mean that *L. hilgendorfi* is the only *Lecythorhynchus* left.

All described *Lecythorhynchus* are distributed in the northern Pacific. The present form, from South Australia, differs from the northern hemisphere taxa in the longer chelifore stumps (nearly 1/3 of the proboscis), in better development of the compound oviger spines, and in the presence of long spines on lateral processes and on coxae 1 and 2. The "serrate" nature of the distal palp segments is not found in *hilgendorfi* or *marginatus*, but is shown by Hilton's delirious figure of *ovatus* (1942, fig. 10). *L. ovatus*, however, has been described with smooth legs and short chelifore stumps. All, including *ovatus*, differ from the present species in having the 9th palp segment more or less cylindrical or linear, and not club-shaped.

The proposed specific name, *ovatooides*, alludes to the resemblance of the "serrated" palp to the figure of *L. ovatus*.

Measurements (♂ holotype) in mm. —

Length of trunk (frontal margin cephalic segment to tip of 4th lateral process)	1.25
Width across 2nd lateral processes	0.78
Length proboscis (dorsal)	0.75
Length chelifore	0.23
Width chelifore	0.08
Third leg: coxa 1	0.20
coxa 2	0.80
coxa 3	0.30
femur	1.03
tibia 1	0.88
tibia 2	1.00
tarsus	0.13
propodus	0.55
claw	0.30

Achelia transfugoides n.sp. Fig. 2.

Material. — 2 ♂ ovig. (one of which is the holotype), 1 ♀. West Island, Toad Head; in *Phacelocarpus* (algae) at 5 m depth; 11 Jan. 1970; S. A. Shepherd coll. (S.A.M.).

1 ♂ ovig. Same locality; on *Acrocarpia* (algae); 7 Jan. 1970. (S.A.M.).

Description. — Trunk clearly segmented in the ♀ paratype, unsegmented in two of the males, with the first segmentation line present in another male. Lateral processes touching each other; lateral processes 1 and 4 with 1 dorsal tubercle, 2 and 3 with 2 dorsal tubercles; each tubercle tipped with a spinule. Abdomen overreaching the 4th lateral process. Anterior margin of cephalon unadorned. Ocular tubercle with a low point and a cylindrical basal part. Eyes well-pigmented.

Proboscis with a swollen basal part and a tubiform distal third, the latter bent downward.

Chelifore rod-shaped, 1-segmented, armed with 3 spinules.

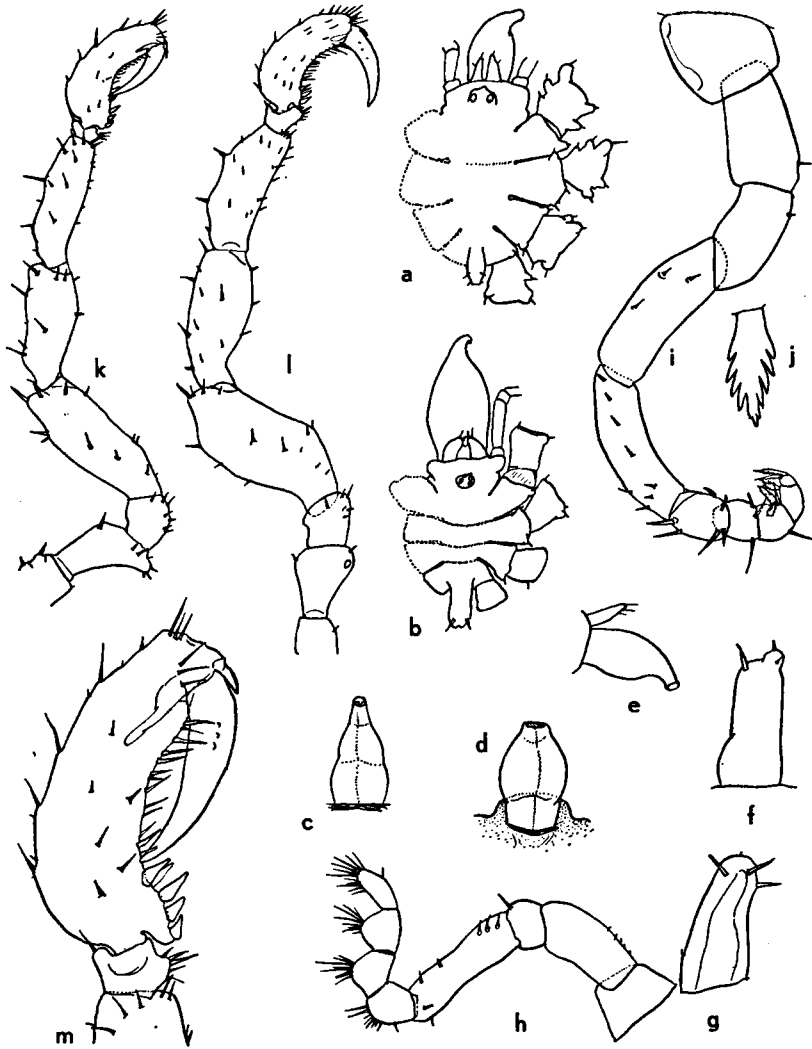


FIG. 2. *Achelia transfugoides* n.sp.

a, body of ♂, dorsal; b, body of ♀, dorsal; c, proboscis of ♀, ventral; d, proboscis of abnormal (damaged?) ♂, ventral; e, proboscis of ♂, from the right; f, chelifore, ♂; g, chelifore of another ♂; h, palp ♂; i, oviger ♂; j, compound spine of oviger segment 9, ♂; k, third leg, ♂; l, second leg, ♀; m, distal segments third leg, ♂.

Palp 8-segmented; segment 4 the longest; segments 5, 6, and 7 with ventral bulge.

Oviger (♂) with reversed spinules on segments 4, 5, 6, and 7, and with compound spines on segments 8, 9, and 10, according to the formula 2 : 1 : 2. In ♀ the compound spine formula is 1 : 1 : 1 : 2.

Legs in both sexes with short spines. Femur more swollen in ♀ than in ♂.

Low coxal spur on legs 3 and 4 in ♂. Propodus curved, robust heel with 4 to 5 spines. Small auxiliary claws present.

Remarks. — The specimen collected at the type locality on Jan. 7, 1970, differs from the others in lacking the tubiform distal part of the proboscis. Since the length of the chelifore is also greater in relation to the proboscis length, it is assumed that the tubiform part is broken off in this specimen. The other structural details are similar to those in the type specimens. This abnormal (or damaged) specimen is illustrated in fig. 2d.

Affinities. — There can be little doubt that the present material is closely related to *Achelia transfuga* Stock, 1954, from New Zealand, with which it shares the 1-segmented chelifores, the short 2nd palp segment, and the curious shape of the proboscis. Two other peculiarities of *A. transfuga* are absent, however, in the Australian material, viz., the presence of a compound spine on oviger segment 6, and the absence of auxiliary claws. There can be little doubt, therefore, that the Australian animals represent a distinct species.

The discovery of this new species, in which the trunk segmentation varies from present to absent, and in which oviger spines and auxiliary claws conform more the typical Acheliid pattern than in *A. transfuga*, makes the isolation of *transfuga* in a separate genus, *Aduncorostris*, as proposed by Fry & Hedgpeth, 1969, a matter than can only be solved by the blessings of punch holes in computer cards, but which reaches beyond the simple mind of the humble classical pycnogonologist. At any rate, the presence or absence of articulation lines on the trunk does not appear to be a character of great value, since this feature is subject to interspecific variation in the present species.

Measurements (in mm). —	♂	♀
Length of trunk (frontal margin cephalic segment to tip of abdomen)	0.92	0.80
Length abdomen	0.18	—
Length chelifore	0.20	—
Width across 2nd lateral processes	0.72	0.70
Third leg: coxa 1	0.20	0.23
coxa 2	0.27	0.35
coxa 3	0.20	0.25
femur	0.64	0.75
tibia 1	0.55	0.60
tibia 2	0.60	0.65
tarsus	0.08	0.08
propodus	0.50	0.55
claw	0.32	0.35
auxiliary claw	0.05	0.06

***Achelia assimilis* (Haswell, 1885)**

Lit., Syn. — Fry & Hedgpeth, 1969 : 106.

Material. — 1 ♂. West Island; in red algae on rough side of island; depth 10 m; 20 Jan. 1968; S. A. Shepherd coll. (Z.M.A.).

2 ♂. Western Port, Crawfish Rock; in *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); depth 10 m; 21 Sep. 1969. (Z.M.A.).

Achelia sp.

Material. — 1 juvenile; Western Port, Crawfish Rock; living on *Sargassum* sp. associated with hydroids, *Amphisbetia minima* and *Orthopyxis angulata*; 21 Sep. 1969. (Z.M.A.).

Nymphon aequidigitatum Haswell, 1885. Fig. 3a-d.

Refs. — Clark, 1963 : 5—7, fig. 3.

Material. — 1 ♂ ovig., 1 ♀. Western Port, Crawfish Rock; on *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); depth 10 m; 21 Sep. 1969. (Z.M.A.).

Remarks. — This is an uneasy species. The published figures differ considerably from case to case. Moreover, the present material is (sexually?) dimorphic, and finally the possible synonymy with *N. giraffa* Loman, 1908, may interfere.

To start with the first point: Clark, 1963, fig. 3, illustrates a male with a glabrous 2nd tibia, with a propodal sole carrying spines only, and with short hairs on oviger segments 5 and 6.

Flynn, 1919, pls. XVIII and XIX, illustrates numerous short setae on tibia 2, along with glabrous ovigers. Haswell, 1885, pl. 54 fig. 3, illustrates on the contrary long setae on oviger segments 5 and 6.

The present material differs in turn from all published accounts. The oviger setation is similar to Haswell's figure; the 2nd tibiae bear numerous setae, like in Flynn's figure, but some of these setae are much longer than the diameter of the segment. The propodal sole bears a limited number (about 8) of spines, with numerous setae that are subequal in length to the spines, in between them.

Clark (1963: 7) considers the inflated palm of the chela as an important character, but in the present material the palm of the male is inflated, that of the female not at all. My two specimens form insufficient basis to judge whether this dimorphism is sexually determined.

Finally, there is the question of the synonymy with *N. giraffa* Loman, 1908, revealed both by Loman himself and by Flynn, 1919. *N. giraffa* is known from two records only: Strait of Makassar, Indonesia (Loman, 1908), and Sagami Bay, Japan (Utinomi, 1962). I have re-examined Loman's holotype, which — though it is mounted on a slide — is in perfect condition, to settle the problem of the possible synonymy. As a matter of fact, *N. giraffa* and *aequidigitatum* are very similar indeed, though *N. giraffa* is considerably smaller (♂ ovig., length of trunk 2.15 mm) than *N. aequidigitatum* (♂ ovig., length of trunk 3.48 mm). The general aspect, the inflated chelae, the long 5th palp segment, the very long auxiliary claws, are shared by the two species. After detailed comparison, I think nevertheless that *giraffa* is distinct from *aequidigitatum* on the following grounds:

(1) The fingers of the chela have about 23 teeth in *giraffa*, 35—40 teeth in *aequidigitatum*.

(2) The distal palp segment is clearly longer than segment 3 in *giraffa*, shorter than segment 3 in *aequidigitatum*.

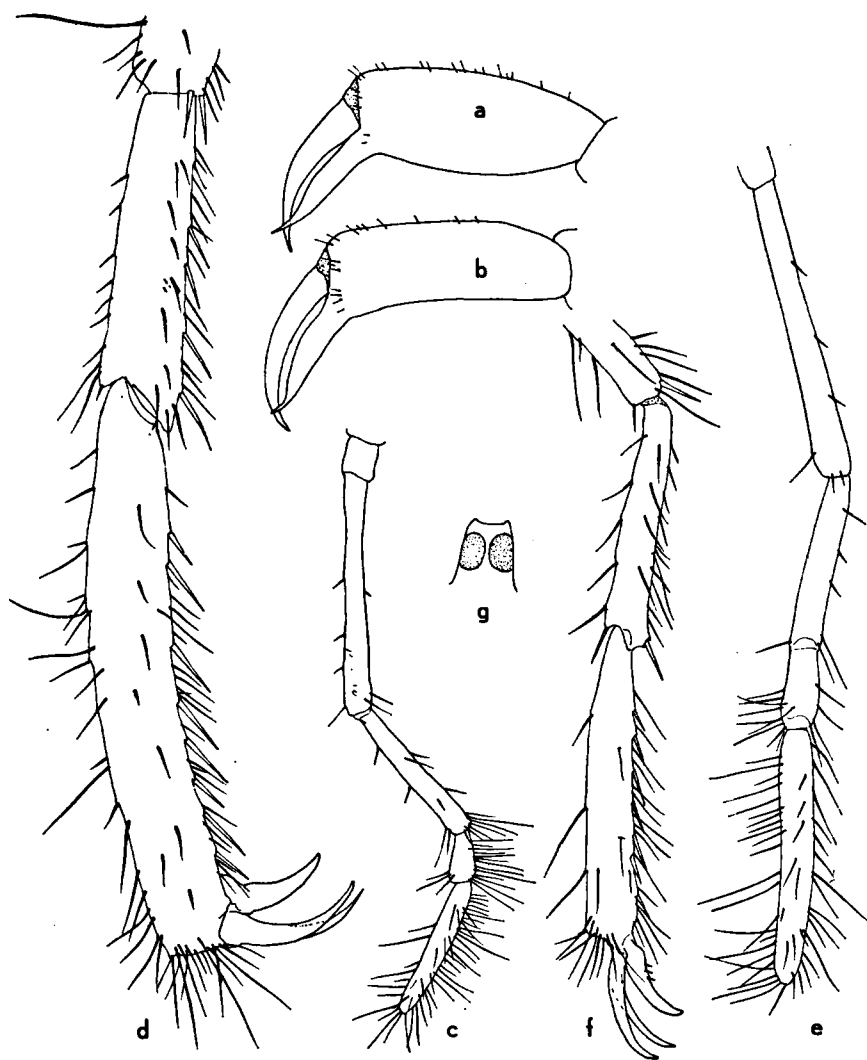


FIG. 3. a-d, *Nymphon aequidigitatum* Haswell, 1885.
 a, chela ♂; b, chela ♀, to the same scale as a; c, palp ♂; d, distal segments of third leg, ♂.
 e-f, *Nymphon giraffe* Loman, 1908, ♂ holotype.
 e, palp; f, distal segments of leg.
 g, *Nymphno mollerii* Clark, 1963, ♂, ocular tubercle in front view.

(3) The setae on the propodal sole are subequal to the spines in *aequidigitatum*, much longer than the spines in *giraffe*.

(4) The main claw of *giraffe* bears 3 teeth in the proximal half of its inner margin; such teeth are absent in *aequidigitatum*.

Utinomi's Japanese record corresponds, according to the published figures, well with *N. giraffe* (although the "pectinate" claw on the legs is not illustrated), whereas Clark's specimens correspond with *N. aequidigitatum*.

***Nymphon moller* Clark, 1963. Fig. 3g.**

N. moller Clark, 1963 : 10—12, fig. 6; Stock, 1968 : 32, fig. 10h.

Material. — 3 ♀, 2 ♂ (ovig.). Western Port, Crawfish Rock; on *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); depth 10 m; 21 Sep. 1969. (Z.M.A.).

Remarks. — The colour of life specimens is, according to a note on the label, cream. The species is known from the Port Jackson area to the Great Australian Bight.

Clark (1963: 11) gave a correct description of the shape of the ocular tubercle, but his figure (6A) does not bear out very clearly that "two small tubercles are seen in front view". This situation is illustrated in fig. 3g of the present paper.

***Nymphon dubitabile* n.sp. Fig. 4.**

Material. — 1 ♂ (ovig.), holotype. Western Port, Crawfish Rock; on *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); depth 10 m; 21 Sep. 1969. (Z.M.A.).

Description. — Trunk slender, lateral processes separated by wide intervals (especially between 2 and 3); short spines on the posterior margin of each lateral process. Neck slender but not very long and wide. Ovipiger bases well indicated, in contact with the first crurigers. Ocular tubercle conical in side view, but bicuspidate in front view; eyes and lateral sense organs distinct. Abdomen short.

Proboscis cylindrical, short.

Chela with fingers distinctly shorter than the palm; 24 to 26 small, densely packed teeth of a size on each finger.

Palp segment 2 the longest; segments 4 and 5 about equal in length.

Ovipiger of Gordon's (1932) type Ia, with a long, curved 5th segment. Compound spines densely implanted, according to the formula 13 : 12 : 13 : 12. Each spine with 5 to 7 lateral denticles. Terminal claw with 8 denticles. Eggs small (diameter 100—125 μ) and numerous.

Legs slender. Two strong spines on coxa 1, 2 to 4 on coxa 2. Tibia 2 the longer segment. Several long spines (subequal to the diameter of the segment) on femur and both tibiae. Number of femoral gland pores difficult to count, approximately 55. Tarsus much longer than propodus. Propodus with 3 to 4 very long spines, and several smaller spinules. Claw slightly less than half as long as the propodus; auxiliary claws about half as long as the claw.

Remarks. — This species is a member of the *N. grossipes* - *mixtum* - *glaciale* - complex. This group of variable forms merging into each other is "ubiquitous circumpolar" (Hedgpeth, 1948: 187) on the northern hemisphere, but is not known South of a latitude of some 35—40° N. The only member of this group known from the southern hemisphere appears to be *N. multident* Gordon, 1932, from Bouvet Island.

From the northern *grossipes* - complex, the present Australian material differs in having palp segment 2 much longer than segment 3 (versus < 3)

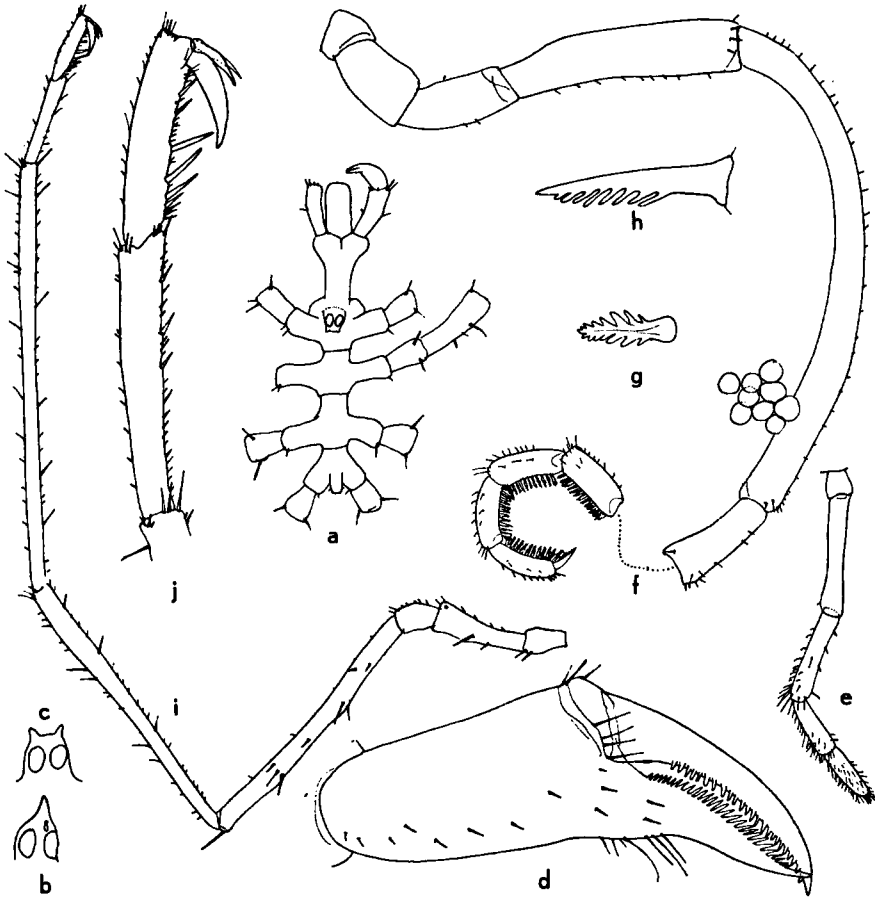


FIG. 4. *Nymphon dubitabile* n.sp., ♂ holotype.

a, body, dorsal; b, ocular tubercle from the left; c, ocular tubercle in front view; d, chela; e, palp; f, oviger and some of the eggs; g, compound oviger spine; h, terminal oviger claw; i, second leg; j, distal segments of second leg.

and in having compound oviger spines with a limited number (5 to 7) of lateral teeth (versus numerous short, crowded denticulations). From the southern *N. multidentis*, the Australian form differs in its much longer tarsus, and — just as from *grossipes* — in the lateral teeth of the compound oviger spines. The bicuspidate shape of the ocular tubercle is also distinctive for the Australian form.

In the light of the great variability observed in the *grossipes*-complex, these differences might be judged insignificant. My own doubts are reflected by the proposed specific name, *dubitabile*. The morphological data in addition to the geographic separation have induced me, however, to consider the Australian form, for the moment being, a separate species.

Measurements of the holotype (♂) in mm. —

Length trunk (frontal margin neck — tip abdomen)	3.93
Width across 2nd lateral processes	1.68
Width 2nd lateral process	0.33
Space between 2nd and 3rd lateral process	0.70
Length proboscis (dorsal)	0.85
Greatest diameter proboscis	0.40
Greatest width neck	0.70
Length scape	0.85
Length palm	0.55
Length movable finger	0.43
Palp — segment 1	0.10
segment 2	0.53
segment 3	0.43
segment 4	0.26
segment 5	0.28
Second leg — coxa 1	0.55
coxa 2	1.10
coxa 3	0.58
femur	3.90
tibia 1	4.53
tibia 2	6.09
tarsus	1.28
propodus	1.03
claw	0.48
auxiliary claw	0.28

Nymphon conirostrum n.sp. Fig. 5.

Material. — 1 ♀ (holotype). West Island, Oedipus Point; depth 13 m; on cave floor and side; on hydroids; 28 Aug. 1969. (Z.M.A.).

Description. — The holotype is a female, with small eggs in the ovaries, but without visible sexual pores, so perhaps not fully adult.

The body is rather robust; the lateral processes are separated by less than their own diameter. The trunk is completely segmented, smooth. The neck is short and wide. The abdomen attains almost the distal end of coxa 1 of leg 4. The ocular tubercle is low, rounded. The eyes are well-pigmented.

The proboscis is conical, triangular in contour, distally provided with a small nipple. In ventral view, the proboscis articulates with the neck by a broad cuticular fold.

The chelifore scape is almost unarmed. The chela is slightly longer than the scape, with curved fingers that are longer than the unarmed palm; each finger is armed with 6 to 7 slender spines of a size.

The palp segments are rather short; segment 3 is the longest, longer than segment 2; segment 5 is subequal to segment 3. The setation is rather poor.

Oviger segment 5 is the longest. The distal segments show the spine formula 4:3:2:4::4. The compound oviger spines bear 1 to 3 lateral teeth.

The legs are not slender, armed with short, scattered spinules only. Tibia 2 is the longer segment. The tarsus is slightly longer than wide, armed with 1 stronger and 4 weaker spines. Propodus straight, without heel; the sole is

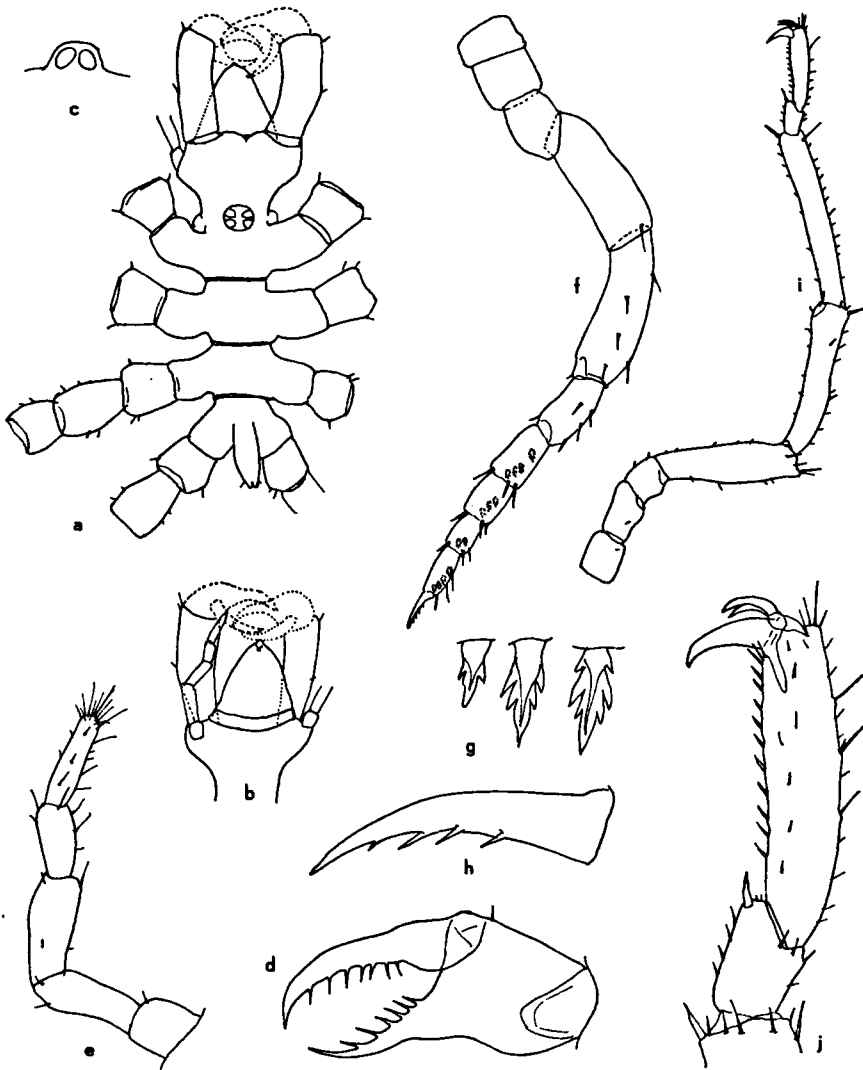


FIG. 5. *Nymphon conirostrum* n.sp., ♀ holotype.

a, body, dorsal; b, anterior part of the trunk, ventral; c, ocular tubercle, in side view; d, chela; e, palp; f, oviger; g, three compound oviger spines; h, terminal oviger claw; i, second leg; j, distal segments of second leg.

armed with some 10 short spinules of a size. The claw is short, less than $1/3$ of the propodus. The auxiliary claws are about half as long as the main claw.

Remarks. — This species is characterized very clearly by the shape of the proboscis, which is not cylindrical as is usual in the genus *Nymphon*, but conical. The proposed specific name alludes to this unique feature.

Measurements of the holotype (♀) in mm. —

Length (tip proboscis to tip abdomen)	3.75
Width neck	0.93
Width across 2nd lateral processes	1.25
Length abdomen	0.60
Length proboscis (ventral, including cuticular fold)	0.80
Basal diameter proboscis	0.55
Length scape	0.88
Length chela	0.95
Second leg — coxa 1	0.45
coxa 2	0.53
coxa 3	0.48
femur	1.28
tibia 1	1.73
tibia 2	2.05
tarsus	0.25
propodus	0.90
claw	0.25
auxiliary claw	0.15

Pallenoides stylirostrum n.sp. Fig. 6.

Material. — 1 ♂ (holotype). West Island, Toad Head; on *Acrocarpia paniculata* (Phaeophyta) at 5 m depth; 7 Jan. 1970; coll. S. A. Shepherd. (S.A.M.).

Description. — Trunk completely segmented. Lateral processes distally armed with 2 or 3 minute spinules; separated by slightly less than their own diameter. Neck short, wide. Ocular tubercle low, rounded with a small point. Eyes present. Abdomen very short, erect.

Proboscis straight, styliform, slightly tapering, pointing forward.

Chelifore scape 1-segmented. Chela of rather "normal" shape; fingers at an angle of about 45° with the palm; fingers short, inner margin vaguely crenulated.

Palps absent.

Oviger 10-segmented. Segment 5 the longest, with distal apophysis. Distal four segments with 5, 4, 4, and 6 compounds spines, respectively; these spines are fan-shaped, armed with slender teeth. No terminal oviger claw.

Legs robust, armed with numerous short spines. Tibia 2 the longest segment. Propodus curved; heel not very clearly marked, armed with 6 stronger spines; sole with 10 to 12 spinules. Claw robust, auxiliary claws vestigial.

Remarks. — The discovery of this species underlines the truth of Clark's statement (1971: 332) that the recent proliferation of taxa, mainly from the Indo-Malayan-Australasian region, calls for a revision of the family Callipallenidae.

The present species approaches, by its general aspect, the genus *Pallenoides*, but the styliform proboscis bridges the gap with *Austropallene* to a certain extent.

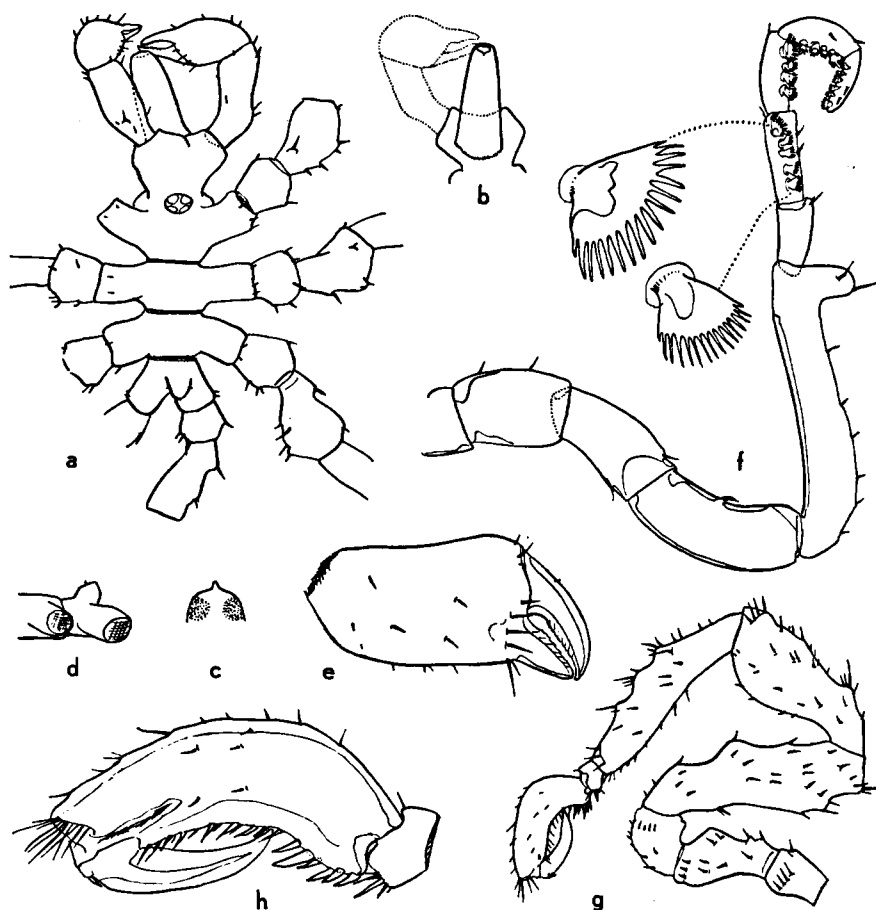


FIG. 6. *Pallenoides stylirostrum* n.sp., ♂ holotype.

a, body, dorsal; b, proboscis, ventral; c, ocular tubercle, in front view; d, fourth trunk segment, from the left; e, chela; f, oviger, the proximal and distal spines of the 6th segment more strongly magnified; g, third leg; h, distal segments of third leg.

Measurements of the holotype (♂) in mm. —

Length cephalic segment	0.58
Trunk segment 2	0.23
Trunk segment 3	0.20
Trunk segment 4 (to tip 4th lateral process)	0.25
Width across 2nd lateral processes	0.70
Greatest diameter neck	0.38
Length proboscis (dorsal)	0.40
Length scape	0.45
Length chela	0.48
Third leg — coxa 1	0.25
coxa 2	0.48
coxa 3	0.25
femur	0.88

tibia 1	0.73
tibia 2	0.83
tarsus	0.09
propodus	0.53
claw	0.30

***Pseudopallene ambigua* Stock, 1956. Fig. 7.**

Ps. ambigua Stock, 1956a: 40—42, fig. 5; Clark, 1963: 31—33, fig. 16.

Material. — 2 ♂, 1 ♀, 1 juv. Pearson Island Survey, Station C; from red algae at 45 m depth; 9 Jan. 1969; coll. S. A. Shepherd. (Z.M.A.).

3 ♂. Pearson Island Survey, Station E; depth 35 m; in algae; 10 Jan. 1969; coll. S. A. Shepherd. (Z.M.A.).

1 juv. Same station as the foregoing, but taken in algae at 22 m. (Z.M.A.).

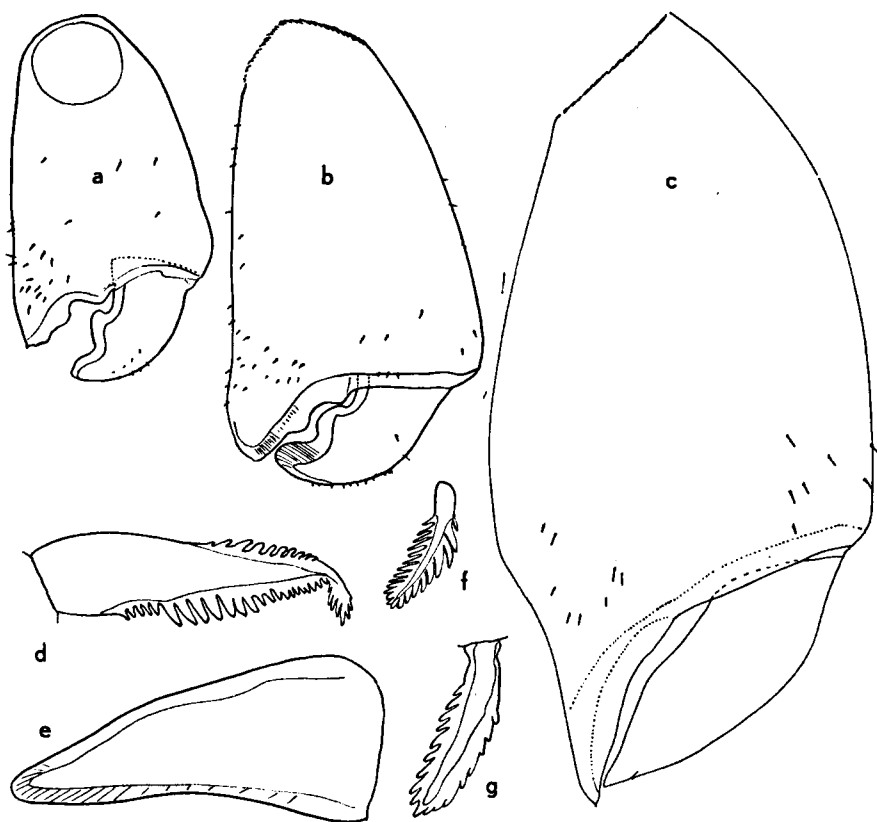


FIG. 7. *Pseudopallene ambigua* Stock, 1956.

a, chela of small-sized juvenile; b, chela of larger juvenile; c, chela of adult ♂ (a, b, and c to the same scale); d, terminal oviger claw of juvenile; e, same of adult ♂; f, terminal compound spine of oviger segment 10, juvenile; g, the same of adult ♂.

Remarks. — Three closely similar species with a conical, tapering proboscis are known from southern Australia: *Pallene laevis* Hoek, 1881, *Pallene pachycheira* Haswell, 1884, and *Pseudopallene ambigua* Stock, 1956. *P. laevis* was transferred by Schimkewitsch, 1909, to a monotypic genus of its own, *Pallenella*, chiefly because of the 2-segmented nature of the chelifore scape. Apart from the scape, *P. laevis* is very similar to *Ps. ambigua*, although the fine ornamentation of the oviger spines (with “two or three stronger teeth on each side near the base, and extremely fine teeth all over the rest”, Hoek, 1881: 79) possibly distinguishes the two species. The number of oviger spines of *laevis* (only the number on segment 10 is known) is about identical to that in *ambigua*. The type-locality for both *ambigua* and *laevis* is Bass Strait. It might be, at least judging from Hoek’s figure, that the shape of the chelae is somewhat different in both species.

Pallene pachycheira Haswell, 1884, transferred on a justified basis to *Pseudopallene* by Flynn, 1919, was described from Port Jackson (near Sydney). It differs from the two species from Bass Strait in having a low number of oviger spines (5 or 6 : 5 : 4 : 4, see Clark, 1963: 33), against 15 : 9 : 10 : 10 in the holotype of *ambigua*. This oviger character, combined with the small size of the holotype, could be an indication that *pachycheira* is based on a juvenile. The shape of the chela of *pachycheira*, with the movable finger hardly shorter than the palm, and in the prolongation of the palm (as opposed to much shorter than the palm and transverse in *ambigua*), is a character to be used with caution, since it is known that in several boreo-arctic species of *Pseudopallene* the shape of the chelae changes in relation to the animal’s age.

Clark, 1963, discussed these taxonomic problems, without reaching a definite conclusion. The present material contains two juveniles, together with a couple of adults that undoubtedly are *Ps. ambigua*. These juveniles have been studied to see if they resemble *Ps. pachycheira*, but this proved not to be the case. The juveniles, whose leg size (see appended measurements) corresponds closely to that of *pachycheira* (see Clark, 1963: 33), agree with the adults of *ambigua* in having a short, transverse movable finger in the chelifore, and in having a fairly high number of compound oviger spines, viz. 13 : 10 : 9 : 9 and 12 : 8 : 8 : 8. The chief differences between full-grown males and juvenile (unsexed) specimens consist in: (1) the much stronger development of the semi-globular tooth on the movable finger of the juvenile, and of the corresponding notch in the immovable finger (compare figs. 7 a, b, and c); (2) the suppression of denticulations on the terminal oviger claw in older specimens (see fig. 7e). In one juvenile (fig. 7d) even *both* margins of the terminal oviger claw are denticulated.

The conclusion from these new facts seems to be that *Ps. ambigua* is not the fully adult stage of *Ps. pachycheira*, and that both taxa thus are distinct. *Ps. ambigua* is, also in the juvenile stage, characterized by a short, transverse movable finger, and a high number of oviger spines: more than 10 on segment 7, total number on segments 7 to 10 ranging from (29) 36 to 61 (73). *Pallenella laevis* is close to *ambigua*, but as long as no new material of

this species becomes known, its 2-segmented scape suffices to consider it distinct, even on generic level.

Measurements (mm). —

	coxa 1	coxa 2	coxa 3	fem.	tib. 1	tib. 2	tars.	prop.	claw
P2 ♂, Stat. E	1.07	2.21	1.07	5.09	5.36	6.97	0.27	1.54	0.67
P2 juv., Stat. E	0.54	0.87	0.54	2.01	2.28	2.55	0.13	0.87	0.47
P3 juv., Stat. C	0.33	0.53	0.25	1.40	1.50	1.75	0.10	0.68	0.45

Stylopallene cheilorhynchus Clark, 1963

S. cheilorhynchus Clark, 1963 : 36—38, fig. 19.

Material. — 1 ♂. Pearson Island Survey, Station B; from algae at 12 to 18 m depth; 8 Jan. 1969; coll. S. A. Shepherd. (Z.M.A.).

1 juv. West Island, Oedipus Point; depth 13 m; on cave floor and side; on hydroids; 28 Aug. 1969. (Z.M.A.).

Stylopallene longicauda n.sp. Fig. 8.

Material. — 1 ♂ (ovig.), holotype, and 3 ♀, paratypes. Western Port, Crawfish Rock; depth 10—20 m; associated with *Amathea* sp. (Bryozoa); 21 Sep. 1969; coll. S. A. Shepherd. (Z.M.A.).

Description. — Closely related to the type-species of the genus *Stylopallene*, *S. cheilorhynchus* Clark, 1963. It agrees with that species in the general shape of the body, more in particular in the absence of a segmentation line between trunk segments 3 and 4, in the shape of the chela, and in the structure of the oviger.

The proboscis is slightly more slender than in *cheilorhynchus*. The lateral processes are separated by a narrow but distinct interval. The abdomen is long, reaching to the end of coxa 1 of leg 4.

The distal oviger segments bear small compound spines, according to the formula 12 : 7 : 6 : 9. These are almost smooth or bear a few irregular denticulations. The terminal claw bears 1 dorsal (!) denticle.

The legs are much more slender than in *cheilorhynchus*; tibia 2 is the longer segment. The propodus is arched; the heel and the proximal part of the sole bear a field of spines; the central part of the sole is devoid of armature; the distal part bears a field of minute spinules again. Claw long and slender.

Remarks. — Though very close to *S. cheilorhynchus*, the new species is at once distinguished by its long, slender abdomen (short, broad, and rounded in *cheilorhynchus*). The much longer and more slender legs form an additional characteristic. The propodal sole of *cheilorhynchus* is evenly armed with spinules, whereas in the new species there is a very typical unarmed stretch in the middle of the sole.

According to a note on the label, the live colour consists of "alternate transverse bands of black and cream". Traces of this colour pattern are still visible in the preserved animals: the neck and lateral processes are dark, the central part of the trunk and the abdomen are bright; the proximal half

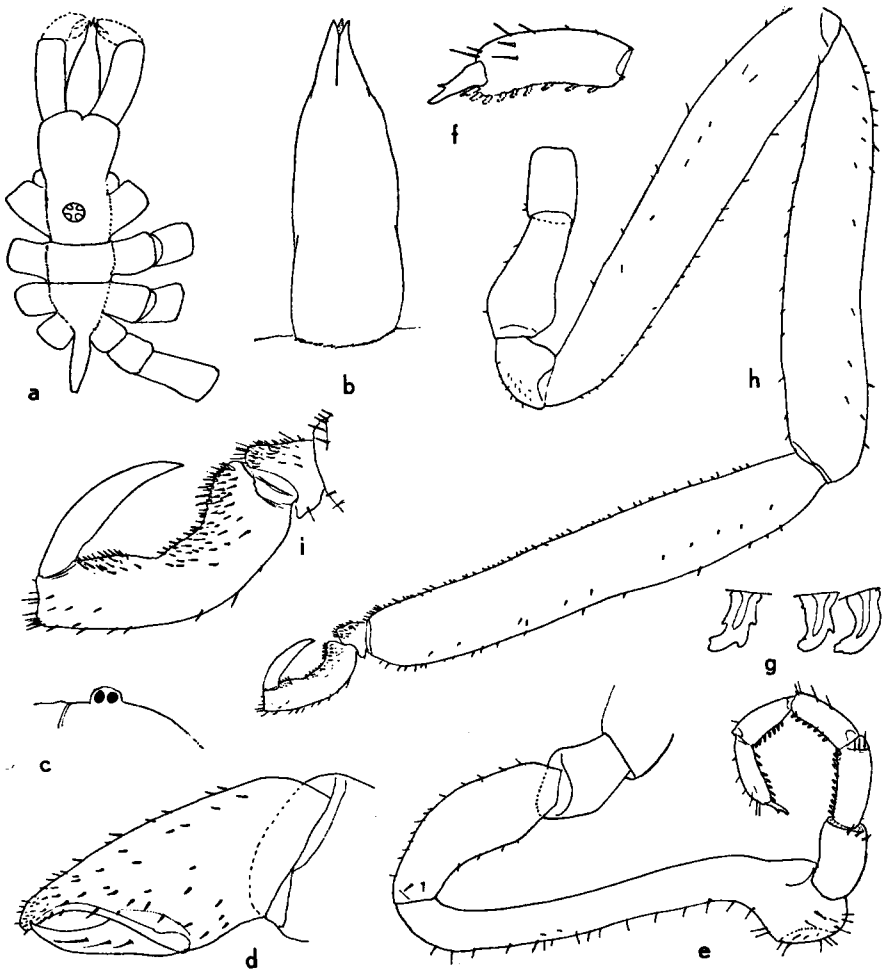


FIG. 8. *Stylopallene longicauda* n.sp., ♂ holotype.

a, body, dorsal; b, proboscis, ventral; c, ocular tubercle from the right; d, chela; e, oviger; f, distal portion of oviger; g, three of the compound oviger spines; h, second leg; i, distal segments of second leg.

of the long leg segments is bright, the distal part dark. The propodus is bright again.

Measurements (♂ holotype) in mm. —

Length trunk (frontal margin cephalic segment to tip abdomen)	3.13
Width across 2nd lateral processes	1.53
Length proboscis (ventral)	1.60
Greatest diameter proboscis	0.60
Length abdomen	0.73
Second leg — coxa 1	0.50
coxa 2	0.93
coxa 3	0.53

[illegible]

Parapallene australiensis (Hoek, 1881)

Lit., syn. : Clark, 1963 : 25—26.

Material. — 2 specimens. Western Port, Crawfish Rock; depth 10 m; on *Halopteris buski* (Hydroida); 21 Sep. 1969; coll. S. A. Shepherd. (Z.M.A.).

Remarks. — According to a note on the label, the live specimens were orange.

Parapallene avida n.sp. Fig. 9.

Material. — 1 ♂ (holotype). Western Port, Crawfish Rock; depth 10 m; on *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); 21 Sep. 1969. (Z.M.A.).

Description. — Lateral processes separated by slightly more than twice their own diameter; each lateral process armed with a few small spinules only. Neck moderately long. Abdomen short, erect. Ocular tubercle with a slender point above the eyes. Eyes distinct.

Proboscis with a cylindrical basal part, and a swollen distal third; mouth situated on the top of a slightly raised rim.

Chelifore scape with a spiniferous swelling near its middle, and a distolateral spiniferous projection. Chela absolutely distinctive, in that the proximolateral corner is produced in a triangular way, giving the palm a trapezoidal aspect. Immovable finger obtuse at the tip, finely crenulated along the inner margin. Movable finger curved, inner margin smooth.

Oviger basis swollen and well-marked. Third and fourth oviger segments fused; the very swollen basal part of this fusion complex originates no doubt from the former 3rd segment. The long, curved 4th segment with strong distal apophysis. Segments 6 to 9 with simple spines only, according to the formula 2 : 1 : 1 : 1. Terminal claw thin, elongated, armed with 4 inner teeth.

Legs slender. Coxa 1 with 2 stronger spines; coxa 2 rather distorted in aspect; femur with 2 stronger medial spines; femur and tibia 1 with a long distal spur. Propodus strongly curved; heel usually with 3 spines, sole with 4 to 7 spinules. Claw half as long as the propodus; no auxiliary claws.

Remarks. — There is some resemblance to *P. famelica* Flynn, 1929 (see also Clark, 1963), but that species is clearly different in the greater intervals between the lateral processes, in the unarmed 1st coxa, in the more numerous teeth on the oviger claw, and above all in the shape of the chelae. In fact, I do not know of any *Parapallene* having the chelae shaped as in the present species. The proposed specific name, *avida* (= greedy, snatchy) alludes to this character.

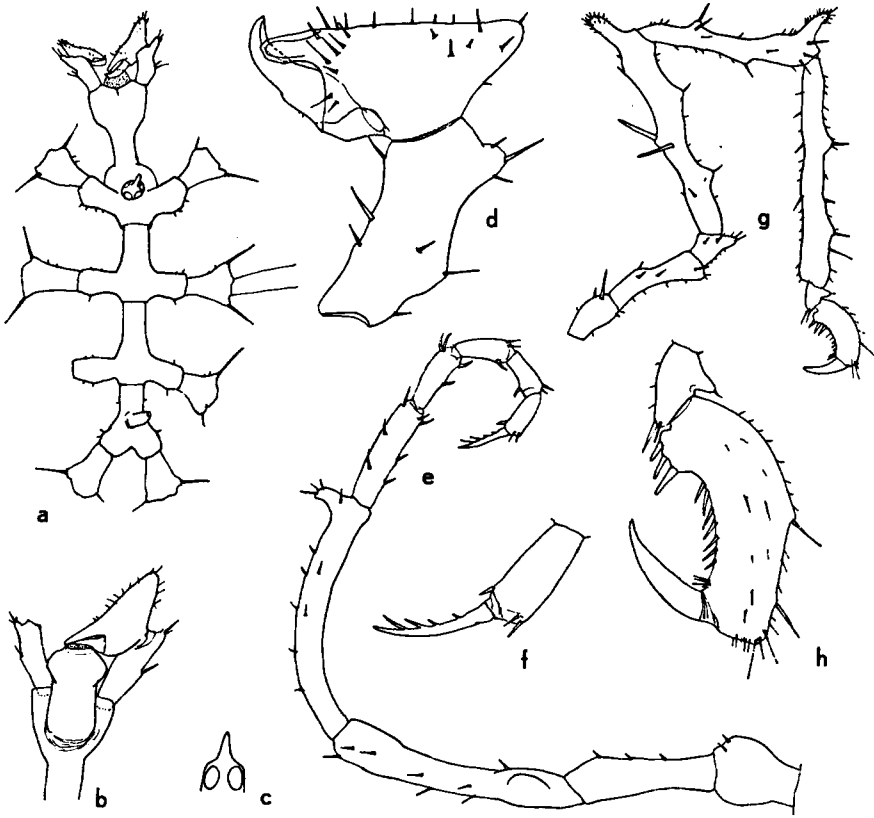


FIG. 9. *Parapallene avida* n.sp., ♂ holotype.

a, body, dorsal; b, anterior part of the body, ventral; c, ocular tubercle, frontal; d, chelifore; e, oviger; f, distal portion of oviger; g, fourth leg; h, distal segments of first leg.

Measurements of the holotype (♂) in mm. —

Trunk segment 1	2.03
Trunk segment 2	1.15
Trunk segment 3	1.26
Trunk segment 4 (to tip of 4th lateral process)	1.07
Greatest diameter neck	0.81
Diameter 2nd lateral process	0.40
Space between 2nd and 3rd lateral processes	0.85
Width across 2nd lateral processes	1.48
Length scape	0.93
Length chela	1.03
Fourth leg — coxa 1	0.70
coxa 2	1.33
coxa 3	0.44
femur	2.92
tibia 1	2.41

[illegible]

Pallenopsis macneilli Clark, 1963. Fig. 10a.

P. macneilli Clark, 1963 : 45-46, fig. 22 A-H.

Material. — 1 ♀. West Island, Oedipus Point; depth 6 m; attached to *Ecklonia* (Phaeophyta) holdfast on vertical face; 28 Aug. 1969; coll. S. A. Shepherd. (Z.M.A.).

Remarks. — The present specimen corresponds with Clark's description. In the female sex, the segmentation line between segments 3 and 4 of the trunk is obscured. The female oviger, not illustrated before, is figured in the present paper (fig. 10a).

The legs of the live specimen are, according to a note on the label, banded in brown.

Pallenopsis sp.

Material. — 1 juv. Pearson Island Survey, Stat. C; 45 m; in red algae; 9 Jan. 1969. (Z.M.A.).

***Pycnothea flynni* Williams, 1940**

P. flynni Williams, 1940: 202—204, figs. 6—9; Clark, 1963: 46—48, fig. 23.

Material. — 1 ♂ ovig. St. Vincent Gulf, Aldinga Reef; intertidal under rocks; in *Gelidium* sp. (Rhodophyta); 3 Sep. 1972; coll. S. A. Shepherd. (Z.M.A.).

Remarks. — This species was known from Western Australia, New South Wales and Norfolk Island. It is new to the state of South Australia.

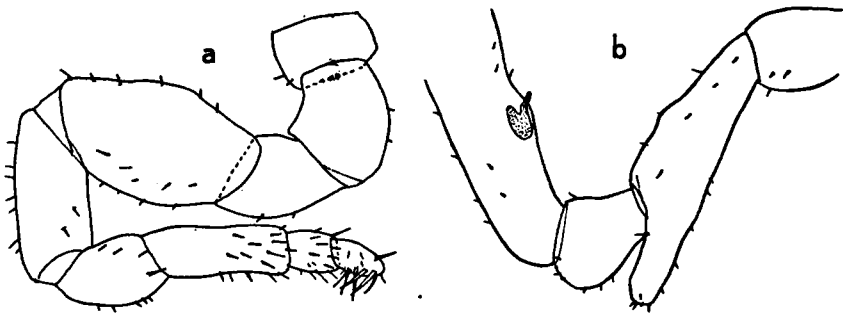


FIG. 10. a, *Pallenopsis macneilli* Clark, 1963, oviger ♀.
b, *Anoplodactylus evansi* Clark, 1963, third leg ♂.

Anoplodactylus evansi Clark, 1963. Fig. 10b.

A. evansi Clark, 1963 : 51—53, fig. 26.

Material. — 1 ♀, 1 ♂. West Island, Judith Cove; depth 5 m; on *Acrocarpia* (Phaeophyta); 11 Jan. 1970; coll. S. A. Shepherd. (S.A.M.).

1 ♀, 1 ♂ (ovig.). Rivoli Bay, South end; on seaweed attached to rock; depth 0.90 m; Jan. 1971; coll. Max Tilbrook. (S.A.M.).

1 juv., probably this species. West Island, Oedipus Point; depth 13 m; on cave floor and side; on hydroids; 28 Aug. 1969. (Z.M.A.).

Remarks. — These specimens resemble closely Clark's description, except perhaps in the male genital spur, which looks slightly longer in the present specimens (see fig. 10b). According to a note on one of the labels, this species is dark red in life.

Anoplodactylus spirostrum n.sp. Fig. 11.

Material. — 3 ♂, 4 ♀, 18 juveniles (incl. 1 ♂ holotype and 1 ♀ allotype). Western Port, Crawfish Rock; depth 10 m; on *Amathea* sp. (Bryozoa) and *Aglaophenia plumosa* (Hydroida); 21 Sep. 1969. (Z.M.A.).

Description. — Trunk segments articulated in some specimens, not separated by articulation lines in others. Lateral processes armed with a minute distal spinule. separated by an interval much narrower than their

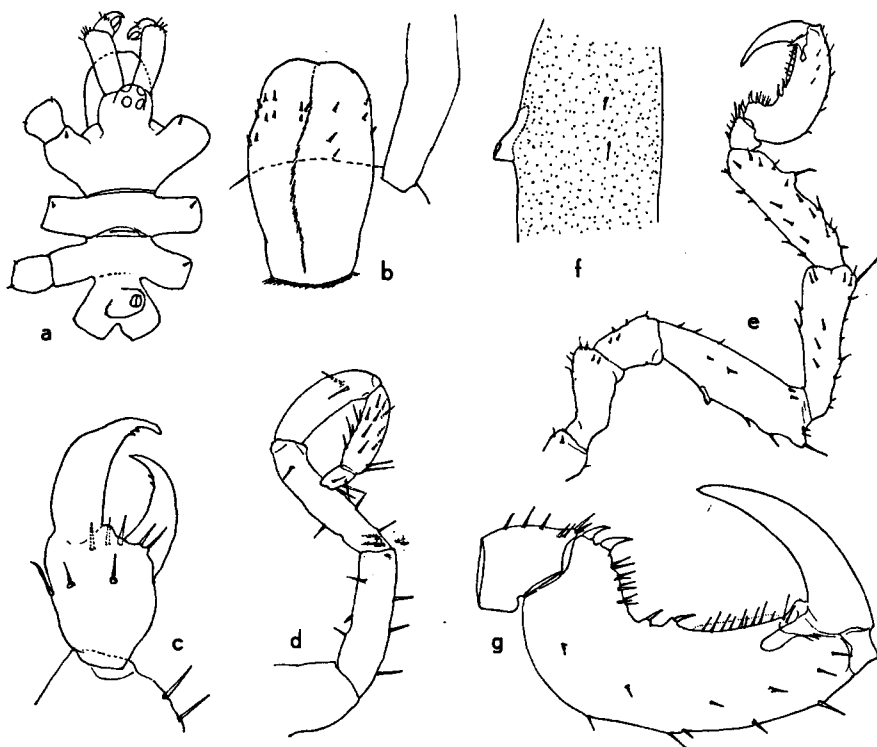


FIG. 11. *Anoplodactylus spirostrum* n.sp.

a, body of ♀, dorsal; b, proboscis ♂, ventral; c, chela ♂; d, oviger ♂; e, third leg ♂; f, cement gland opening on P3 ♂; g, distal segments of third leg. ♂.

own diameter. Ocular tubercle low, rounded. Eyes small, almost circular. Abdomen short, erect. Neck short.

Proboscis more or less barrel-shaped; its distal half ventrally armed in both sexes with quite a few spinules, but without ventral outgrowths.

Scape distally armed with about half a dozen spinules. Chela with curved fingers, each finger with 2 minute teeth near the distal end.

No palps.

Oviger segments 2 and 3 subequal in length. Segment 5 slightly shorter than segment 4, armed with numerous recurved spines. Segment 6 small but present.

Legs robust, bearing numerous short spines, those on the long segments placed sometimes on low processes or tubercles. Femoral cement gland cone hardly raised, nearly slit-like. Propodal heel strongly defined, armed with 2 larger spines. Propodal sole with 2 proximal spinules, and a lamina. No auxiliary claws. Male genital pores on a slight swelling of coxa 2 on legs 3 and 4.

Remarks. — This species resembles *Anoplodactylus* spec. A, of Clark, 1963, but differs from it in a different armature of the fingers of the chelae and in the absence of rudimentary auxiliary claws.

From *A. evansi* Clark, 1963, it differs in the female proboscis (without ventral bosses), in the presence of a propodal lamina, and in the absence of auxiliary claws.

As a matter of fact, the present material seems to differ from all other taxa in *Anoplodactylus* by the combination of the following characters: proboscis (♂, ♀) ventrally spinulated; propodal sole with lamina; no auxiliary claws; cement gland duct only slightly raised; trunk almost unarmed, compactly built. In many features, in particular in the body shape, in the form and armature of the propodus, and in the absence of auxiliaries, the present material resembles *A. minusculus* Clark, 1970, from Queensland. The ♂ oviger is, however, absolutely distinctive in this case.

The proposed specific name, *spinirostrum*, alludes to the ventral armature of the proboscis.

Measurements in mm. —

	♀	♂
Length trunk (frontal margin cephalic segment to tip 4th lateral process)	0.93	0.88
Width across 2nd lateral processes	0.56	0.56
Length proboscis (ventral)	0.43	0.39
Greatest diameter proboscis	0.23	0.23
Third leg — coxa 1	—	0.18
coxa 2	—	0.33
coxa 3	—	0.23
femur	—	0.63
tibia 1	—	0.53
tibia 2	—	0.53
tarsus	—	0.10
propodus	—	0.40
claw	—	0.24

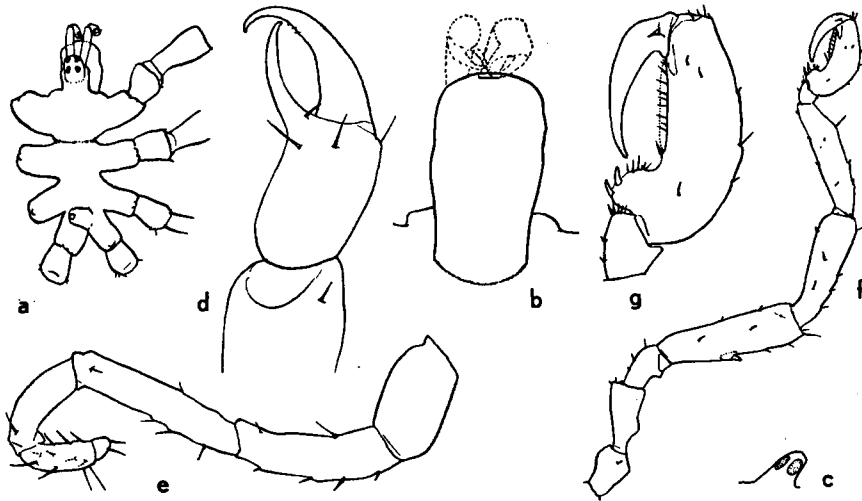


FIG. 12. *Anoplodactylus micros* Bourdillon, 1955, ♂.

a, body, dorsal; b, proboscis, ventral; c, ocular tubercle from the right; d, chela; e, oviger; f, third leg; g, distal segments of third leg.

***Anoplodactylus micros* Bourdillon, 1955. Fig. 12.**

A. micros Bourdillon, 1955: 591—592, pl.I figs. 3—8.

Material examined. — 1 ♂. West Island; in red algae on rough side of island; depth 10 m; 20 Jan. 1968; coll. S. A. Shepherd. (Z.M.A.).

Remarks. — The remark that *Anoplodactylus* is one of those large, difficult genera, will not loosen waves of emotion, I dare say. At present the genus embraces around 70 taxa considered valid, thus not counting the obvious synonyms. A particularly sneaky complication in this genus is, that considerable sexual dimorphism might be present, not only in those parts of the body that have something to do with the reproduction (ovigers, 2nd coxae, femoral glands, etc.), but also in unsuspected and unerotic parts such as the proboscis.

The present material belongs by a number of characters (small size; body segmentation more or less suppressed; propodal sole with lamina; auxiliary claws present though rudimentary; short tubiform cement gland duct) to a small group of tropical species, consisting of *minutissimus* Stock, 1954, *trispinosus* Stock, 1951, and *micros* Bourdillon, 1955. It corresponds almost perfectly with the latter species in all characters, except in body segmentation. *A. micros* has well-developed segmentation lines between the trunk segments I and II, as well as between II and III, whereas the present male has a rather indistinct segmentation line between trunk segments I and II only.

From *A. minutissimus*, the present material differs by a shorter proboscis, and by its 3rd oviger segment that is only slightly longer than the 2nd. The

shape of the chelae and the length of the cement gland duct are more or less similar to those in *minutissimus*.

From *A. trispinosus*, the present material differs in the longer fingers of the chela, in the absence of small spinules on the lateral processes and ocular tubercle, and in having a much shorter cement gland duct.

Although the Australian specimen is slightly larger than Bourdillon's type specimen (likewise a male) from Martinique, this still is one of the smallest Pycnogonida known. As can be seen from the measurements, the distal segments of the first leg are slightly longer than those of the posterior legs, but all legs are morphologically similar.

This is another small-sized *Anoplodactylus* that appears to be circum-tropical. Other examples in the same genus being *A. trispinosus* Stock, *A. portus* Calman, *A. pygmaeus* (Hodge) (this species also in temperate waters), *A. batangense* (Helfer), and *A. digitatus* (Böhm).

Measurements (in mm) of the male from West Island. —

Length trunk (frontal margin cephalic segment to tip 4th lateral process)	. . .	0.88		
Width across 2nd lateral processes		0.58		
	P1	P2	P3	
Coxa 1		0.18	0.18	0.18
Coxa 2		0.30	0.33	0.33
Coxa 3		0.23	0.23	0.23
Femur		0.78	0.68	0.65
Tibia 1		0.68	0.55	0.55
Tibia 2		0.65	0.58	0.55
Tarsus		0.10	0.10	0.10
Propodus		0.40	0.38	0.35
Claw		0.30	0.25	0.23

Anoplodactylus sp.

Material. — 1 ♂ (juv.) with incompletely segmented ovigers. Pearson Island Survey, Station B; from algae; depth 12—18 m; 8 Jan. 1969 (Z.M.A.).

1 ♀ (juv.). Western Port, Crawfish Rock; depth 10 m; on *Halopteris buski* (Hydroida); 21 Sep. 1969. (Z.M.A.).

1 ♂ (juv.). Same locality; depth 10—20 m; on *Amathea* sp. (Bryozoa); 21 Sep. 1969. (Z.M.A.).

Remark. — It is not possible to identify these juveniles correctly.

Pycnogonum aurilineatum Flynn, 1919

P. aurilineatum Flynn, 1919: 92—95, pl. XIII figs. 1—2, pl. XIV fig. 3.

Material. — 1 ♀. West Island; in red algae on rough side of island; depth 10 m; 20 Jan. 1968; coll. S. A. Shepherd. (Z.M.A.).

1 ♀. Bass Strait, Lady Julia Percy Island, Square Reef; depth 15 m; in red algae; Jan. 1968; coll. S. A. Shepherd. (Z.M.A.).

Remark. — Notwithstanding its large size this species is only rarely recorded.

REFERENCES

- BOURDILLON, A.
1955 Les Pycnogonides de la croisière 1951 du "Président Théodore Tissier". — Rev. Trav. Inst. Pêches marit., 19: 581—609, pls. I—III.
- CLARK, W. C.
1963 Australian Pycnogonida. — Rec. Aust. Mus., 26 (1): 1—81.
1970 New Pycnogonida from Queensland. — Trans. roy. Soc. New Zealand, 12 (3): 13—20.
1971 Pycnogonida of the Snares Islands. — New Zealand J. mar. freshw. Res., 5 (2): 329—341.
- FLYNN, T. T.
1919 A re-examination of Professor Haswell's types of Australian Pycnogonida. — Pap. Proc. roy. Soc. Tasmania, 1919: 70—92, pls. XVIII—XXII.
1929 Pycnogonida from the Queensland coast. — Mem. Queensl. Mus., 9 (3): 252—260.
- FRY, W. G. & J. W. HEDGPETH
1969 The fauna of the Ross Sea, 7. Pycnogonida, 1. Colossendeidae, Pycnogonidae, Endeidae, Ammotheidae. — New Zealand ocean. Inst. Mem., 49: 1—139.
- GORDON, I.
1932 Pycnogonida. — Discovery Reps., 6: 1—138.
- HASWELL, W. A.
1885 On the Pycnogonida of the Australian coast, with descriptions of new species. — Proc. Linn. Soc. New So. Wales, 9 (1884): 1021—1034, pls. 54—57.
- HEDGPETH, J. W.
1948 The Pycnogonida of the western North Atlantic and the Caribbean. — Proc. U.S. nation. Mus., 97 (3216): 157—342.
1949 Report on the Pycnogonida collected by the Albatross in Japanese waters in 1900 and 1906. — Proc. U.S. nation. Mus., 98 (3231): 233—321.
- HILTON, W. A.
1942 Pycnogonids from Hawaii. — Occ. Pap. Bishop Mus., 17 (3): 43—55.
- HOEK, P. P. C.
1881 Report on the Pycnogonida. — Rep. sci. Res. Voy. Challenger, (Zool.) 3 (10): 1—167, pls. I—XXI.
- LOMAN, J. C. C.
1908 Die Pantopoden der Siboga-Expedition. — Siboga Monogr., 40: 1—88, pls. I—XV.
- SCHIMKEWITSCH, W.
1909 Nochmals über die Periodicität in dem System der Pantopoden. — Zool. Anz., 34 (1): 1—13.
- STOCK, J. H.
1954 Pycnogonida from Indo-West-Pacific, Australian and New Zealand waters. — Vidensk. Medd. Dansk naturh. Foren., 116: 1—168.
1956a Pantopoden aus dem Zoologischen Museum Hamburg, 2. Pantopoden aus Süd Australien und Neu Seeland. — Mitt. Hamburg zool. Mus. Inst., 54: 40—45.

- 1956b Tropical and subtropical Pycnogonida, chiefly from South Africa. — Vidensk. Medd. Dansk naturh. Foren., **118**: 71—113.
- 1968 Pycnogonida collected by the Galathea and Anton Bruun in the Indian and Pacific Oceans. — Vidensk. Medd. Dansk naturh. Foren., **131**: 7—65.
— In preparation: Pycnogonida. In: Shore and reef fauna of Hawaii, 2nd ed.
- UTINOMI, H.
- 1959 Pycnogonida of Sagami Bay. — Publs. Seto mar. biol. Lab., **7** (2): 197—222.
- 1962 Pycnogonida of Sagami Bay — supplement. — Publs. Seto mar. biol. Lab., **10** (1): 91—104.
- WILLIAMS, G.
- 1940 Contributions to the fauna of Rottnest Island, 11. Pycnogonida of Western Australia. — J. roy. Soc. West. Aust., **25** (11): 197—204.

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